

Appl. No. 10/718,231

Amdt. Dated December 16, 2004

Reply to Office Action of September 23, 2004

AMENDMENTS TO THE SPECIFICATION:

Please replace the paragraph beginning at page 3, line 11, of the specification with the following amended paragraph:

According to a fourth aspect of the present invention, in the automatic tracking apparatus for the reflector, when a reflection light image of the reflector ~~is-not-existed~~ does not exist in the first light receiving area, the reflection light image of the reflector is detected in the second light receiving area, and when the reflection light image of the reflector ~~is-not-existed~~ does not exist in the second light receiving area, the reflection light image is detected in the image sensor area.

Please replace the paragraph beginning at page 11, line 13, of the specification with the following amended paragraph:

When a plurality of reflectors ~~is-existed~~ exists in the area of the image sensor 27, the arithmetic means 37 recognizes a light image ~~existed~~ existing in the light receiving area Q4 as a reflection light image from a reflector, and detects a position of the reflection light image, and then the reflection light image is tracked. When the reflection light image ~~is-not-existed~~ does not exist in the light receiving area Q4, by conducting a detection of a reflector from a difference among fields after turning on or turning off a laser light source (Japanese Patent Laid-Open H07-198383), a light

image ~~existed~~ existing in the light receiving area Q5 is recognized as an image by the reflection light image from the reflector, and a position of the reflector is detected, and then the reflector is tracked. When the reflection light image is ~~not existed~~ does not exist in the light receiving area Q5, a light image ~~existed~~ existing in the area Q2 of the image sensor 27 is recognized as the reflection light image from the reflector, and a position of the reflector is detected, and then the reflector is tracked.

Please replace the paragraph beginning at page 12, line 7, of the specification with the following amended paragraph:

This operation for judging whether or not the reflection light image ~~is existed~~ exists on one horizontal scanning line within the area Q2 is conducted for one field, and when the reflection light image from the reflector ~~is not existed~~ does not exist in one ~~field~~ field, processing for detecting a reflector is conducted repeatedly for each field. When the reflection light image ~~is existed~~ exists in one field, it is judged whether or not the reflection light image ~~is existed~~ exists in the light receiving area Q4 (S. 2), and when the reflection light image ~~is existed~~ exists in the light receiving area Q4, the surveying machine body 8 is rotated with ~~tacking~~ tracking so as to position the reflection light image at the image center CQ (FIG. 5) (S. 3). When the reflection light image ~~is not existed~~ does not exist in the light receiving area Q4, it is judged whether or not the reflection light image ~~is existed~~ exists in the light receiving area Q5 (S. 4), and if the reflection light image ~~is existed~~ exists in the light receiving area Q5, the surveying machine body 8 is rotated with tracking so as to position the reflection light image at the image center CQ (S. 3). When the reflection light image ~~is not existed~~ does not exist in the light receiving area Q5, it is judged whether or not the reflection light image ~~is existed~~ exists in the area Q2 of the image sensor 27 (S. 5), and if the reflection light image ~~is existed~~ exists in the area Q2 of the image sensor 27, there is a possibility that a maximum acceleration of a surveying machine is exceeded, so a test for judging whether or not the light image is the reflector 2 is carried out (S. 5'), and when the light image is the reflector 2, the surveying

machine body 8 is rotated with tracking so as to position the reflection light image at the image center CQ. If the light image is not the reflector, a step goes to a wait operation or a search operation.

Please replace the paragraph beginning at page 13, line 5, of the specification with the following amended paragraph:

If the reflection light image ~~is not existed~~ does not exist in the area Q2 of the image sensor 27, the wait operation (stop tracking) is conducted or the search operation is conducted (S. 6). Moreover, as in a condition ~~that where~~ the reflection light image ~~is not existed~~ does not exist in the area Q2 of the image sensor 27, there are cases ~~that where~~ a light shielding object crosses between a reflector and a surveying machine body or a reflector moves faster than a rotation angle speed of a surveying machine body.

Please replace the paragraph beginning at page 13, line 15, of the specification with the following amended paragraph:

(Embodiment 2)

In this embodiment 2, as shown in FIG. 8, positions of light images such as M1 and M2 other than a reflector which ~~are existed~~ exist in the area Q2 of image sensor 27, and a size and a shape of a reflection light image M0 are stored in the storing portion 38, and by the arithmetic means 37, the reflector is specified from a positional relationship between a position of the reflection light image M0 and the light images M1, M2 other than the reflection light images M0 or the shape and size of the reflection light image M0.

Please replace the paragraph beginning at page 13, line 26, of the specification with the following amended paragraph:

For example, during tracking a reflector, if the reflector is shielded by a light shielding object, and the reflector is moved during that time, and if an object such as a headlight and an electric light other than the reflector ~~is existed~~ exists in the light receiving area Q5, there is a possibility that the head light, the electric light or the like is misjudged as the reflector for the object to be tracked, however, the reflector can be specified by a positional relationship between the position of the reflector and the position of the object other than the reflector, and the shape and the size of the reflector, so the possibility for misjudging the object other than the reflector as the reflector can be decreased.

Please replace the paragraph beginning at page 14, line 9, of the specification with the following amended paragraph:

Especially, when the reflection light image M0 from a reflector ~~is existed~~ exists in the light receiving area Q4, and the size and the shape thereof are stored in the storing portion 38, and by the arithmetic means 37, a misjudgment for recognizing the object other than the reflector as the reflector can be reduced if the reflector is judged by comparing the shape and the size stored in the storing portion 38 with each of light images and the size detected in the areas Q2, Q5 of the image sensor 27.

Please replace the paragraph beginning at page 14, line 16, of the specification with the following amended paragraph:

According to the present invention, an automatic tracking apparatus for a reflector, even ~~though~~ though an illumination portion for illuminating measurement light toward a reflector and a light receiving portion having an image sensor for receiving a reflection light image of the measurement light illuminated toward the reflector are provided in a surveying machine body, tracking can be carried out without being disturbed.